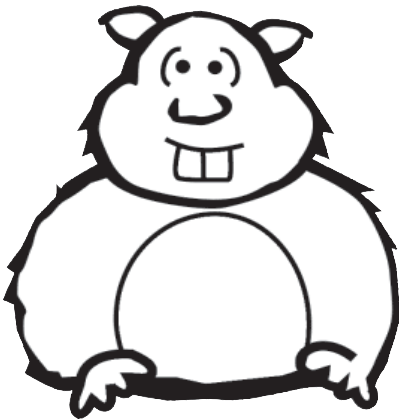


## Spring Brings a Rude Awakening for the Groundhog's Kissing Cousin and Other Species



According to recent scientific studies, some plants and animals that depend on spring weather cues to help rouse them from their winter sleep now are experiencing a rude awakening. A growing body of evidence suggests that climate change is affecting species like marmots (a kissing cousin of the groundhog), whose emergence from hibernation is influenced by spring weather. In addition, the changing climate may affect migratory birds such as robins, whose northward movements in spring are tied in part to weather conditions.

Some species are waking from their winter's sleep or arriving at their appointed feeding and breeding grounds anywhere from 4 to 38 days early, depending on the species, habitat, and temperature. Scientists are citing climate change as one of the reasons for nature's premature spring activities.

### Marmots and Climate Change

Scientific studies at the Rocky Mountain Biological Laboratory (RMBL) have investigated changes in hibernation patterns of marmots and migratory patterns of species like the American robin in the West Elk Mountains of Colorado. The RMBL scientists looked at trends in several indicators related to species' hibernation and migratory patterns:

- Total winter snowfall
- Date of the first marmot sighting
- Amount of snowpack on the date of first sighting
- Date of spring flowering of vegetation in the area

Compiling indicator data from 1975 to 2000, the scientists found that marmots are emerging from their burrows more than a month earlier than they were 23 years ago.

The increasingly warm air temperatures in early spring (thought by many scientists to be caused in part by long-term climate change) may have something to do with marmots getting short-changed in their sleep.

Marmots leave their burrows only after checking to see if the outside air temperature is agreeable. If prematurely warm temperatures prompt them to emerge from their holes with snow still on the ground, they may have to search harder for food using their remaining fat reserves to jump-start their digestive systems, which have been resting during their winter's nap. The marmot's diet, for the most part, is vegetarian. They eat leaves, flowers, field crops such as clover and alfalfa, and many kinds of wild herbs. Certain garden crops like peas, beans, and corn also are favorites. On rare occasions, they eat snails, insects, or young

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birds that they come upon by accident. In early spring, when these foods are sparse, they eat bark, small branches, and twigs.

Marmots that are fooled into leaving their burrows early may not find the food they need to sustain themselves because the growing season does not really start until the snow is melted. They could starve.

Climate change also could affect the marmots' reproduction. A brief mating season occurs in the spring, soon after the marmot awakens from hibernation. Females produce a litter of two to nine marmot pups, toward the end of March, after a gestation period of 28 days. If marmots emerge too early in the season to find adequate food, they may mate less frequently or produce smaller litters.

The RMBL study illustrates how sensitive some wildlife species can be to climate change. In the future, we might see similar responses among groundhogs and other animals that hibernate, such as chipmunks and ground squirrels.

### **Climate Change and Other Species**

Warm spring weather might cause some migratory bird species to arrive at their breeding grounds before food sources are available, leaving them hungry and vulnerable to late-winter cold spells and snowstorms. Scientists have begun to see shifts in migration patterns and population declines in some species that may be related to the changing climate:

- In the Rocky Mountains, the American robin is arriving two weeks earlier in the spring than it did in 1981.
- Over the last 40 years, Adélie penguin population counts in the Antarctic have dropped, due in part to a decline in the frequency of years with extensive winter sea ice. Penguins find much of their food at the edge of the sea ice.
- Populations of butterflies like the Edith's checkerspot in North America and 9 of 14 species of European butterflies have shifted their distributions northward by some 92 kilometers/57.2 miles and 200 kilometers/124.3 miles, respectively.
- Some British birds, such as the European swallow (the same species as the familiar North American barn swallow), have advanced their arrival dates to feeding grounds by one to eight weeks.
- Also in Europe, scientists are seeing numerous long-distance migrants, such as flycatchers, beginning to suffer, possibly because the timing of their migration is falling out of synch with the availability of key food sources.
- Insect populations may be influenced by a warmer climate, causing major pest outbreaks in areas such as the boreal forests of Alaska and pine forests in the western United States.

Thousands of scientists predict that the Earth's climate will change because of human activities such as burning fossil fuels. These climate changes could have both harmful and beneficial effects on wildlife and wildlands, including many U.S. species that are sensitive to climatic changes. Climate, ecosystems, and human activities are interactive and interdependent. The decisions we make today, as well as our actions, may have a significant effect on the wildlife in your backyard and beyond.

Here's what you can do:

- Inform yourself and others. For more information on climate change, wildlife, and wildlands, visit EPA's Global Warming Site: [www.epa.gov/globalwarming](http://www.epa.gov/globalwarming) and click on "Impacts."
  - Encourage more research such as that described in this article. If you work for a research organization, suggest including a climate change component to your studies.
  - Use more fuel-efficient (or non-motorized) modes of transportation.
  - Carpool.
  - Purchase electronic devices and appliances with the ENERGY STAR® label.
  - Plant trees to provide shade and to absorb carbon dioxide from the atmosphere.
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